Abstract of the Disclosure

A linear actuator includes a plurality of sub-modules disposed in adjacent array and adapted to translate reciprocally parallel to a common axis. A plurality of shape memory alloy wires extend generally linearly and parallel to the axis, and are each connected from one end of a sub-module to the opposed end of an adjacent sub-module. The SMA wires are connected in a circuit for ohmic heating that contracts the SMA wires between the sub-modules. The sub-modules are linked by the SMA wires in a serial mechanical connection that combines the constriction stroke displacement of the SMA wires in additive fashion to achieve a long output stroke. Moreover, the sub-modules are assembled in a small volume, resulting in an actuator of minimal size and maximum stroke displacement. The sub-modules may be rods or bars disposed in closely spaced adjacent relationship, or concentric motive elements, with the serial mechanical connection extending from each motive element to the radially inwardly adjacent motive element, whereby the innermost motive element receives the sum of the translational excursions of all the motive elements concentric to the innermost element. The SMA linear actuator includes a restoring spring assembly having a restoring force that decreases with increasing displacement to minimizeresidual strain in the SMA components. The SMA wires are connected for ohmic heating in various series and parallel circuit arrangements that optimize force output, cycle time, current flow, and ease of connection.